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(54) FOREIGN SUBSTANCE PREVENTION UNIT TO PROTECT ELECTRO-PHOTOGRAPHIC PRINTER FROM FOREIGN SUBSTANCES

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(57) **ABSTRACT**

A foreign substance prevention unit use with an electro-photographic printer is installed over a waste toner injection hole such that it closes the waste toner injection hole when a photosensitive medium is separated from a main body of the electro-photographic printer, and opens the waste toner injection hole when the photosensitive medium is installed in the main body of the electro-photographic printer. The foreign substance prevention unit is formed of an elastic material.

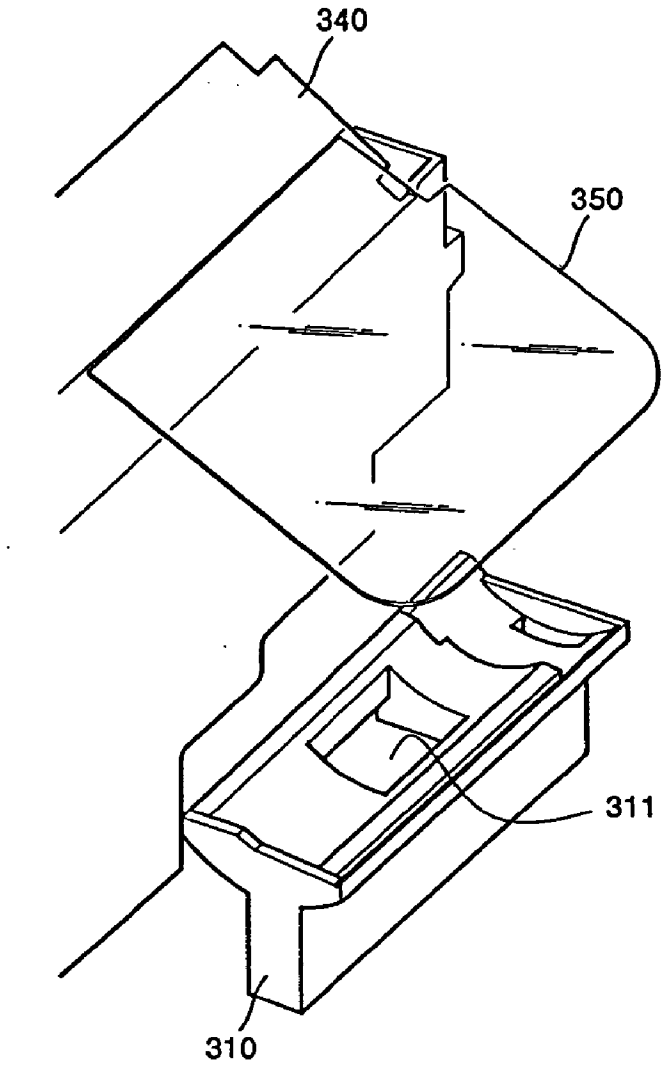
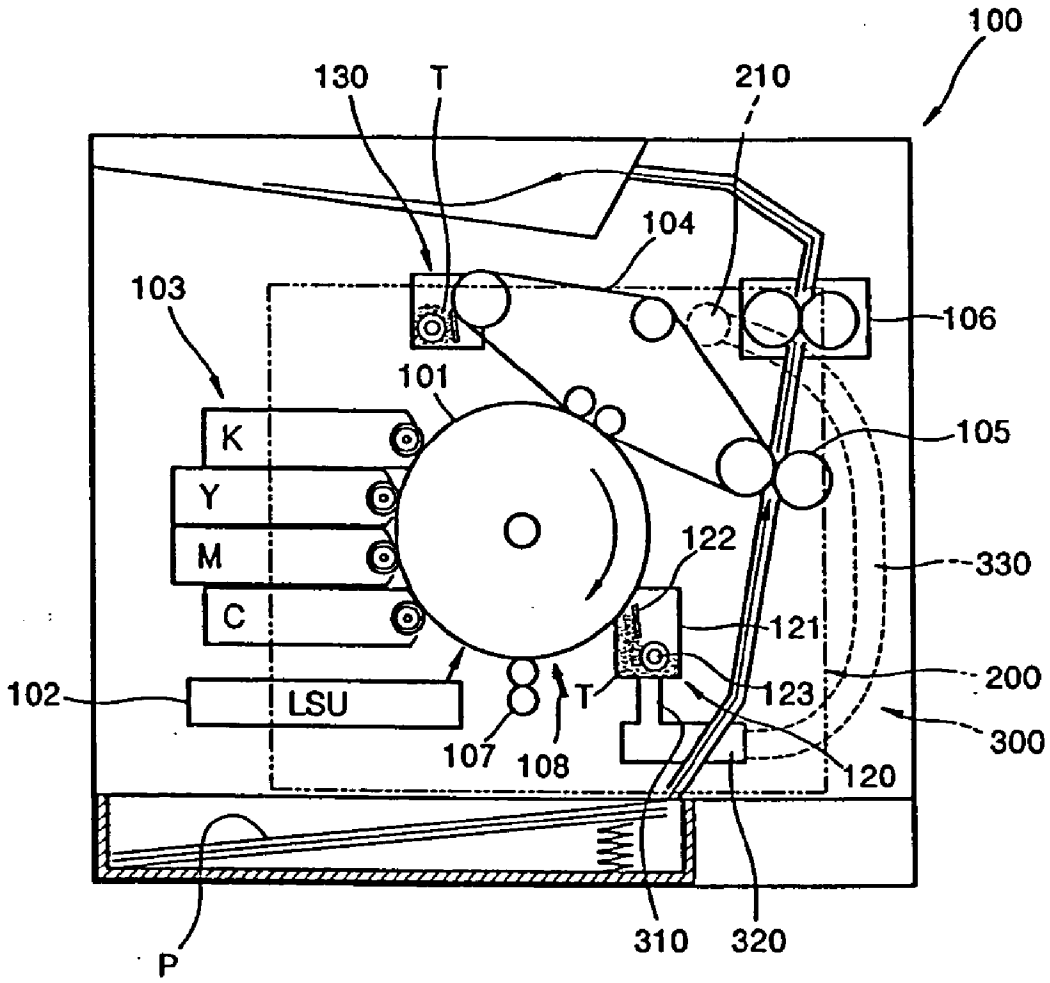


FIG. 3


100
130
T
210
104
103
106
101
105
K
Y
M
C
122
330
121
102
LSU
T
123
200
107
108
120
300
P
310
320

latent electrostatic image on the outer circumferential surface of the photosensitive drum **101**.

[**0036**] When the latent electrostatic image approaches the developer **103**C due to a rotation of the photosensitive drum **101**, the cyan-colored toner contained in the developer **103**C can be attached to the latent electrostatic image, thereby forming the cyan-colored toner image. When the cyan-colored toner image approaches the transfer belt **104** due to the rotation of the photosensitive drum **101**, the cyan-colored toner image can be transferred onto the transfer belt **104** due to the electrical potential difference between the photosensitive drum **101** and the transfer belt **104** and/or a contact pressure therebetween. When the cyan-colored toner image is completely transferred onto the transfer belt **104**, the magenta-, yellow-, and black-colored toner images can sequentially be formed and then sequentially transferred onto the transfer belt **104** so that the cyan-, magenta-, yellow-, and black-colored toner images can overlap one another on the transfer belt **104**. The overlapping cyan-, magenta-, yellow-, and black-colored toner images on the transfer belt **104** can form the color toner image. When the printing medium P passes between the transfer belt **104** and the transfer roller **105**, the color toner image can be transferred onto the recording medium P. Thereafter, the fixing unit **106** can fix the color toner image onto the printing medium P by applying heat and pressure and then discharges the resulting printing medium P, thus completing an entire process of forming a color image on the recording medium P.

[**0037**] The cyan-, magenta-, yellow-, and black-colored toner images can temporarily be contained in the photosensitive drum **101** and then in the transfer belt **104**. In a process of transferring the cyan-, magenta-, yellow-, and black-colored toner images from the photosensitive drum **101** to the transfer belt **104** or from the transfer belt **104** to the printing medium P, some toner particles may remain on the photosensitive drum **101** or the transfer belt **104**.

[**0038**] Referring to **FIG. 3**, the electro-photographic printer **100** can include cleaning units **120** and **130** which remove a waste toner from the photosensitive drum **101** and the transfer belt **104**, respectively, and a waste toner transfer unit **300** which transfers the waste toner removed from the photosensitive drum **101** and the transfer belt **104** by the cleaning units **120** and **130**, respectively, and a container **200** which stores the waste toner transferred by the waste toner transfer unit **300**.

[**0039**] The cleaning unit **120** can include a housing **121**, a blade **122** which contacts the photosensitive drum **101** and scrapes the waste toner off the photosensitive drum **101**, and a transfer unit **123** which transfers the waste toner to a discharger **123** disposed at one end of the housing **121**. The cleaning unit **130** may have the same structure as the cleaning unit **120**. A reference character T denotes the waste toner collected in to the cleaning unit.

[**0040**] An injection hole **210** can be formed on a top surface of the container **200** so that the container can efficiently accept and contain the waste toner. In this embodiment, the transfer belt **104** can be located above the photosensitive drum **101**, and thus, the waste toner removed from the transfer belt **104** by the cleaning unit **130** can be directly injected into the container **200** from the cleaning unit **130** via an injection hole (not shown).

[**0041**] The waste toner removed from the photosensitive drum **101** by the cleaning unit **120**, unlike the waste toner removed from the transfer belt **104** by the cleaning unit **130**, can be transferred from the cleaning unit **120** to the container **200** by the waste toner transfer unit **300** rather than being directly injected into the container **200**, because there is a difference between a height of the injection hole of the container **200** and a height of the cleaning unit **120**.

[**0042**] The waste toner transfer unit **300** can include a duct and a transfer screw. The duct can comprise first through third sub-ducts **310**, **320**, and **330**. The first sub-duct **310** connects the cleaning unit **120** to the second sub-duct **320**. Awaste toner injection hole **311** of **FIG. 4**, through which the waste toner removed from the photosensitive drum **101** by the cleaning unit **120** is discharged, can be formed on a top of the first sub-duct **310**. The third sub-duct **330** can be formed as a circular pipe which can be easily bent to connect the second sub-duct **320** and the container **200**. The transfer screw can be installed in the duct and transfers the waste toner injected into the duct via the waste toner injection hole **311** to the container **200**.

[**0043**] Referring to **FIGS. 4 through 7**, a foreign substance prevention unit **350**, which prevents foreign substances from going into the waste toner transfer unit **300** via the waste toner injection hole **311**, can be disposed over the waste toner injection hole **311**.

[**0044**] One end of the foreign substance prevention unit **350** can be fixed to a bracket **340** installed in the main body of the electro-photographic printer **100**, and the other end of the foreign substance prevention unit **350** can be located over the waste toner injection hole **311**.

[**0045**] The foreign substance prevention unit **350** can be, but not necessarily, formed of a flexible and elastic material, for example, plastic, because the foreign substance prevention unit **350** should not be an obstacle to installation/separation of the photosensitive drum **101** into/from the main body of the electro-photographic printer **100**.

[**0046**] As shown in **FIGS. 4 and 5**, when the photosensitive drum **101** is separated from the main body of the electro-photographic printer **100**, the foreign substance prevention unit **350** can cover the waste toner injection hole **311** so that the foreign substances from an outside of the electro-photographic printer **100** can be prevented from going into the waste toner transfer unit **300** via the waste toner injection hole **311**.

[**0047**] As shown in **FIGS. 6 and 7**, when the photosensitive drum **101** is installed in the main body of the electro-photographic printer **100**, the foreign substance prevention unit **350** can contact the photosensitive drum **101** and then is bent and folded due to a contact force therebetween such that it does not serve as an obstacle to connection of the cleaning unit **120** to the waste toner injection hole **311**.

[**0048**] Thereafter, when the photosensitive drum **101** is separated from the main body of the electro-photographic printer **100**, the foreign substance prevention unit **350** can return to its original state illustrated in **FIG. 4** or **5** due to its elasticity.

[**0049**] As described above, a foreign substance prevention unit of an electro-photographic printer according to the present general inventive concept can prevent foreign sub-